AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

1-26 (cancelled)

27. (currently amended) A functionalized carbon nanotube, comprising:
~~the surface of which carries~~
a surface having homogeneously-distributed covalently bound reactive and/or activable functional groups ~~which are homogeneously distributed on said surface~~, wherein
said functionalized carbon nanotube ~~being~~ is substantially intact and soluble in organic and/or aqueous solvents.

28. (currently amended) [[A]] The functionalized carbon nanotube according to claim 27, wherein said carbon nanotube is a single-walled (SWNT) or a multi-walled carbon nanotube (MWNT).

29. (currently amended) [[A]] The functionalized carbon nanotube according to claim 28, wherein the organic solvents are selected from [[a]] the group ~~comprising~~ consisting of dimethylformamide, dichloromethane, chloroform, acetonitrile, dimethylsulfoxide, methanol, ethanol, toluene, isopropanol, 1,2-dichloroethane, N-methylpyrrolidone, and tetrahydrofuran.

30. (currently amended) [[A]] <u>The</u> functionalized carbon nanotube according to claim 29, of following general formula: $[C_n]-X_m$

wherein:

C_n are surface carbons of a substantially cylindrical carbon nanotube of substantially constant diameter, said diameter being from about 0.5 to about 50 nm, in particular from about 0.5 to 5 nm for SWNTs and from about 20 to about 50 nm for MWNTs,

X is a functional group,

n is an integer from about ~~3.10^3~~ $\underline{3 \times 10^3}$ to about ~~3.10^6~~ $\underline{3 \times 10^6}$,

m is an integer from about 0.001n to about 0.1n,

there are from about ~~2.10^{-11}~~ $\underline{2 \times 10^{-11}}$ moles to about ~~2.10^{-9}~~ $\underline{2 \times 10^{-9}}$ moles of X functional groups per cm^2 of carbon nanotube surface.

31. (currently amended) [[A]] <u>The</u> functionalized carbon nanotube according to claim 30, wherein X is a pyrrolidine ring, of the following general formula (I):

I
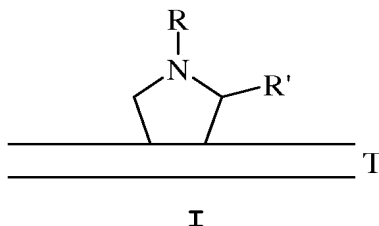
wherein<u>:</u>

T represents a carbon nanotube, and ~~independently from each other~~

R and R'<u>, independently from each other,</u> represent –H or a group of

formula $-M-Y-(Z)_a-(P)_b$,

wherein ~~independently from each other~~

a and b, independently from each other, represent 0 or 1, provided R and R' cannot simultaneously represent H, ~~and:~~

M is a spacer group from about 1 to about 100 atoms,

Y is a reactive group when a=b=0, or derived from a reactive group,

Z is a linker group, liable to be linked to a P group, and, optionally, to release said P group, and
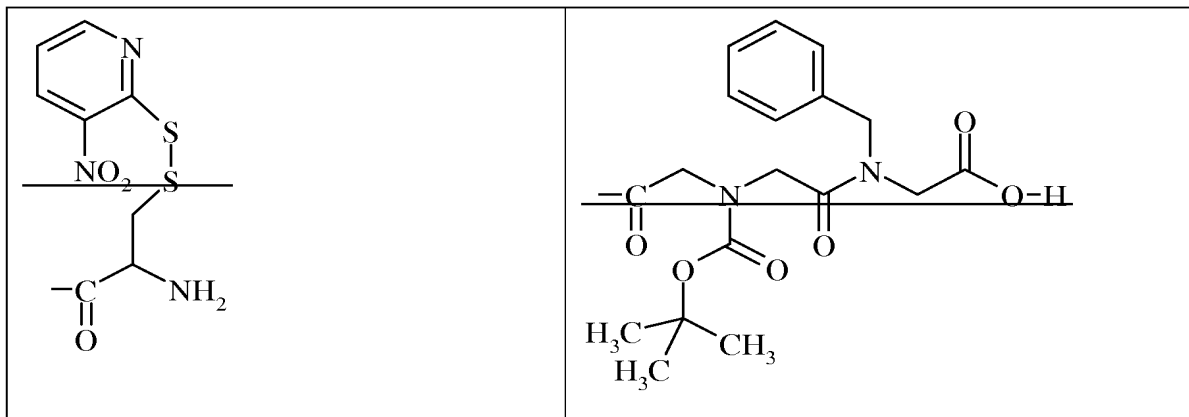
P is an effective group allowing spectroscopic detection of said functionalized carbon nanotube, or an active molecule, liable to induce a biological effect.

~~• M is a spacer group from about 1 to about 100 atoms, such as a group selected from the list comprising $-(CH_2)_r-$ or $(CH_2-CH_2-O)_r-CH_2-CH_2-$, wherein r is an integer from 1 to 20;~~

~~• Y is a reactive group when a=b=0, such as a group selected from the list comprising $-OH$, $-NH_2$, $-COOH$, $-SH$, $-CHO$, a ketone such as $-COCH_3$, an azide or a halide;~~

~~or derived from a reactive group, when a or b is different from 0, such as a group selected from the list comprising $-O-$, $-NH-$, $-COO-$, $-S-$, $-CH=$, $-CH_2-$, $-CC_kH_{2k+1}=$, wherein k is an integer from 1 to 10, in particular $-CCH_3=$, or $-CHC_kH_{2k+1}-$, wherein k is an integer from 1 to 10, in particular $-CHCH_3-$;~~
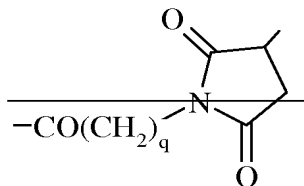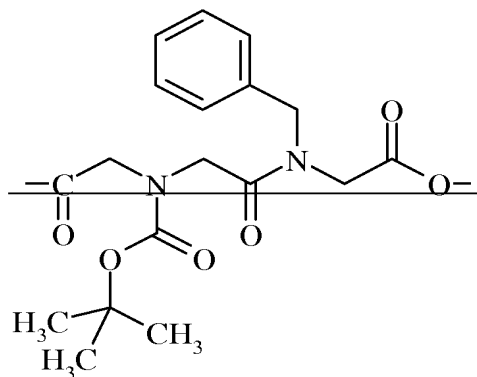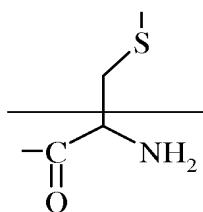
~~• Z is a linker group, liable to be linked to a P group, and if need be to release said P group, such as a group of one of the following formulae when a=1 and b=0:~~
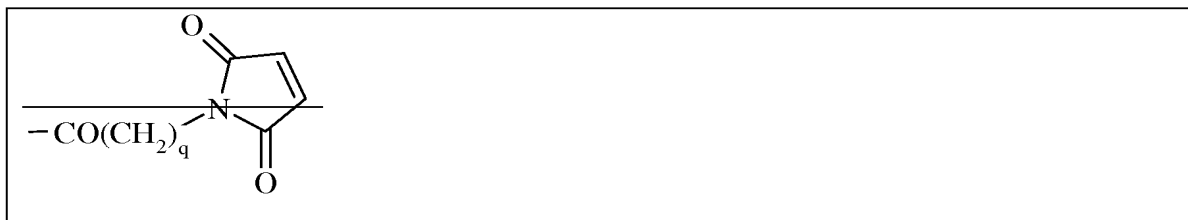
~~wherein q is an integer from 1 to 10;~~

~~or of one of the corresponding following formulae when a=1 and b=1:~~
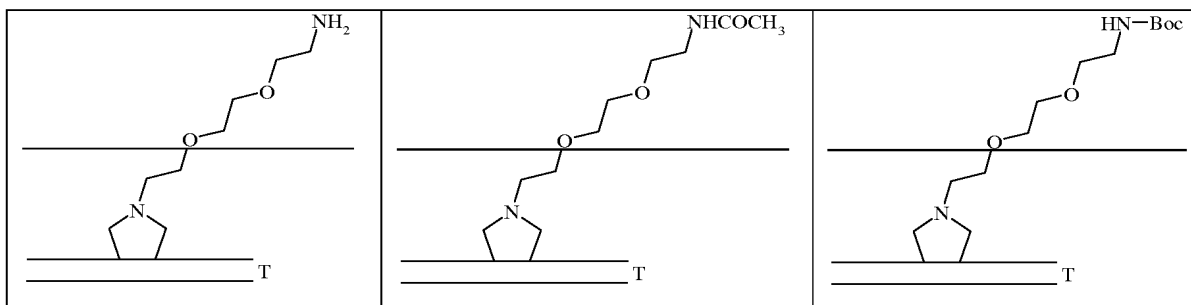

~~wherein q is an integer from 1 to 10;~~

~~• P is an effective group allowing spectroscopic detection of said functionalized carbon nanotube, such as a fluorophore, such as FITC, or an active molecule, liable to induce a biological effect, such as an amino acid, a peptide, a pseudopeptide, a protein, such as an enzyme or an antibody, a nucleic acid, a carbohydrate, or a drug.~~

~~if appropriate at least one of Y, Z, or P groups, can be substituted by a capping group, such as CH₃CO- (acetyl), methyl, or ethyl, or a protecting group such as methyl, ethyl, benzyl, tert-butyl, trityl, 3-nitro-2-pyridylsulfenyl, tert-~~

~~butyloxycarbonyl (Boc), fluorenylmethyloxycarbonyl (Fmoc), benzylcarbonyl, trimethylsilylethyloxycarbonyl, phtalimide, dimethylacetal, diethylacetal or, 1,3 dioxolane.~~
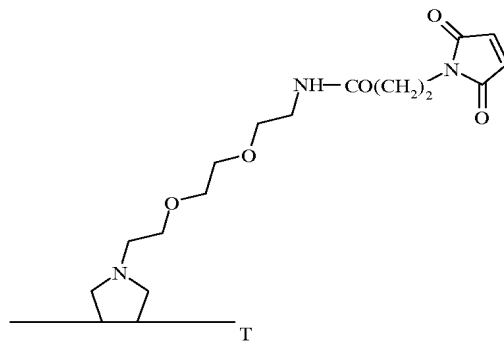
32. (currently amended) [[A]] <u>The</u> functionalized carbon nanotube according to claim 31, wherein a=b=0 and Y is a reactive group selected from the ~~list comprising~~ <u>group consisting of</u> -OH, -NH$_2$, -COOH, -SH, -CHO, a ketone, ~~such as COCH$_3$,~~ an azide, [[or]] <u>and</u> a halide<u>.</u>~~, in particular NH$_2$, said functionalized carbon nanotube being, if appropriate, substituted by a capping or a protecting group, in particular a Boc or acetyl group, and being for instance a functionalized carbon nanotube of one of the following formulae:~~
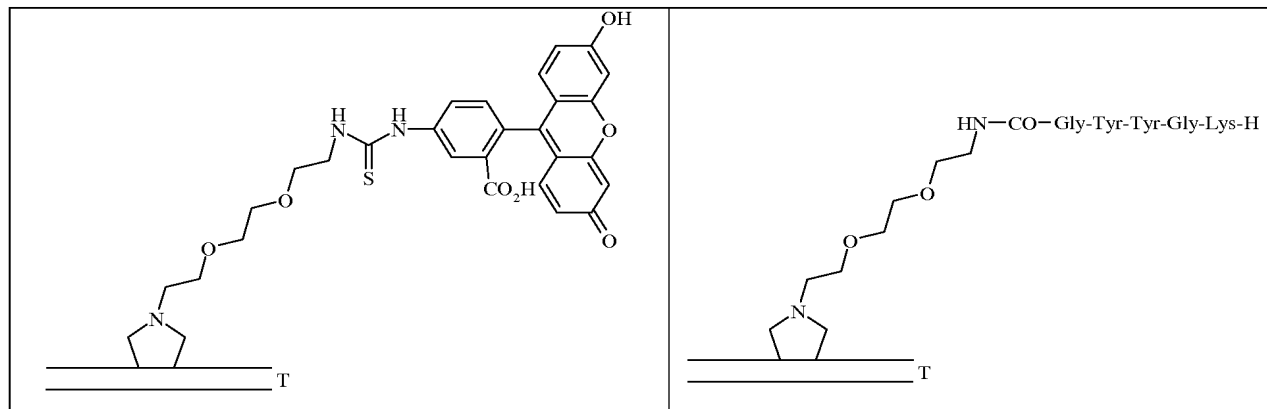

33. (withdrawn) A functionalized carbon nanotube according to claim 31, wherein a=1 and b=0, Y is derived from a reactive group and selected from the list comprising -O-, -NH-, -COO-, -S-, -CH=, -CH$_2$-, -CC$_k$H$_{2k+1}$=, wherein k is an integer from 1 to 10, in particular -CCH$_3$=, or -CHC$_k$H$_{2k+1}$-, wherein k is an integer from 1 to 10, in particular -CHCH$_3$-, and Z represents in particular the group of the following formula:
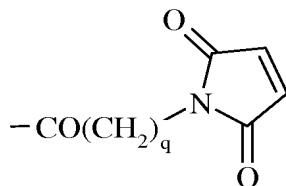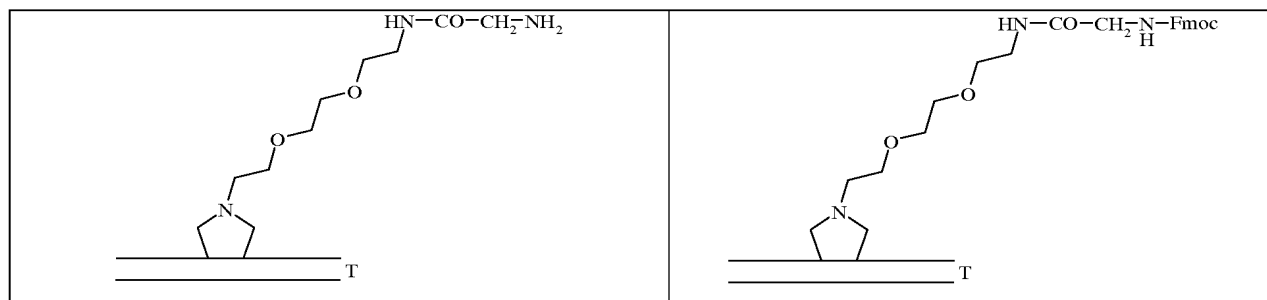
wherein q is an integer from 1 to 10, said functionalized carbon nanotube being if appropriate substituted by a protecting group being for instance the functionalized carbon nanotube of the following formula:
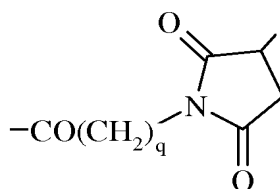

34. (withdrawn) A functionalized carbon nanotube according to claim 31, wherein a=0 and b=1, Y is derived from a reactive group and selected from the list comprising $-O-$, $-NH-$, $-COO-$, $-S-$, $-CH=$, $-CH_2-$, $-CC_kH_{2k+1}=$, wherein k is an integer from 1 to 10, in particular $-CCH_3=$, or $-CHC_kH_{2k+1}-$, wherein k is an integer from 1 to 10, in particular $-CHCH_3-$, and P is an effective group or an active molecule, in particular FITC, an amino acid, such as glycine, or a peptide, such as the peptide H-Lys-Gly-Tyr-Tyr-Gly-OH, said functionalized carbon nanotube being if appropriate substituted by a protecting group, such as Fmoc, and being for instance a functionalized carbon nanotube of one of the following formulae:
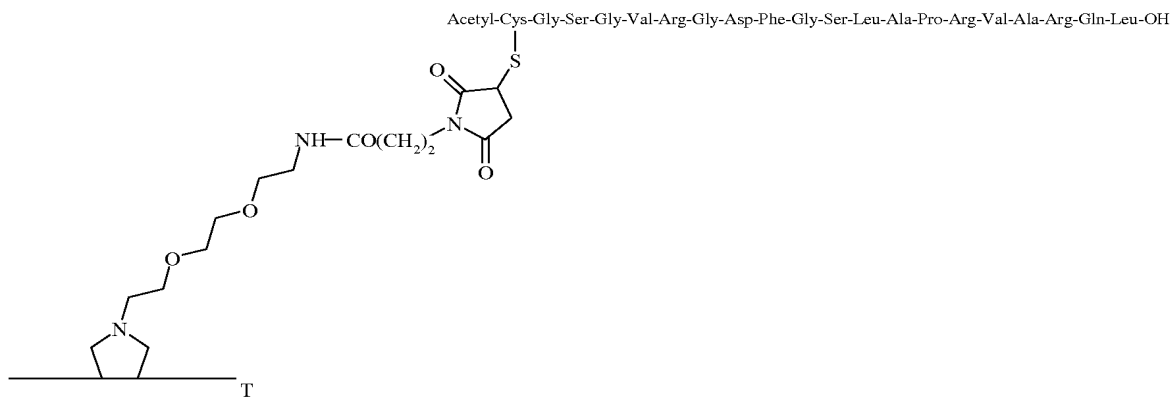
35.   (withdrawn)   A functionalized carbon nanotube according to claim 31, wherein a=1 and b=1, Y is derived from a reactive group and selected from the list comprising $-O-$, $-NH-$, $-COO-$, $-S-$, $-CH=$, $-CH_2-$, $-CC_kH_{2k+1}=$, wherein k is an integer from 1 to 10, in particular $-CCH_3=$, or $-CHC_kH_{2k+1}-$, wherein k is an integer from 1 to 10, in particular $-CHCH_3-$, Z represents in particular the group of the following formula:
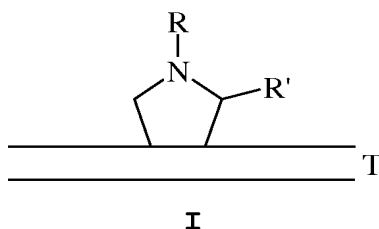

wherein q is an integer from 1 to 10, and P is a peptide, such as the peptide Acetyl-Cys-Gly-Ser-Gly-Val-Arg-Gly-Asp-Phe-Gly-Ser-Leu-Ala-Pro-Arg-Val-Ala-Arg-Gln-Leu-OH,   said functionalized carbon nanotube being if appropriate substituted by a protecting group, being for instance the functionalized carbon nanotube of the following formula:

36. (withdrawn) A functionalized carbon nanotube according to claim 34, wherein P is a peptide or a protein, said peptide or protein comprising in particular a B cell epitope or a T cell epitope, such as a T helper epitope or a T cytotoxic epitope, or a mixture thereof.
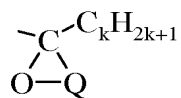
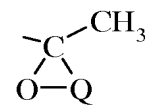37. (withdrawn) A process for preparing a functionalized carbon nanotube of the following formula I:

$$
\begin{array}{c}
R \\
| \\
N \!-\! R' \\
\diagdown \diagup \\
\underline{} \\
\underline{} T
\end{array}
$$

I

wherein T represents a carbon nanotube and independently from each other R and R' represent −H or a group of formula −M−Y, provided R and R' cannot simultaneously represent H, wherein:

- −M− is a spacer group from about 1 to about 100 atoms, such as a group selected from the list comprising −$(CH_2)_r$− or −$(CH_2-CH_2-O)_r-CH_2-CH_2$−, wherein r is an integer from 1 to 20;

- −Y is a reactive group, such as a group selected from the list comprising, −OH, −NH_2, −COOH, −SH, −CHO, a ketone such as −$COCH_3$, an azide, a halide, if appropriate protected,

such as −O−Q, −NH−Q, −COO−Q, −S−Q, −$CH(OQ)_2$, $\begin{array}{c} -C-C_kH_{2k+1} \\ \diagdown\diagup \\ O-Q \end{array}$ wherein k

is an integer from 1 to 10, in particular $\begin{array}{c} -C-CH_3 \\ \diagdown\diagup \\ O-Q \end{array}$, wherein Q is a protecting group or forms a protecting group with the adjacent atoms to which it is linked;

said process comprising the following step:

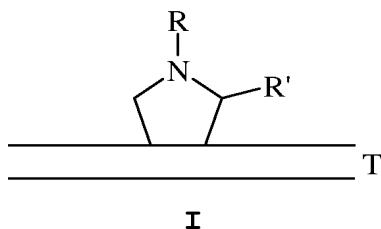- adding, to a carbon nanotube, the compounds R'−CHO and R−NH−CHR''−COOR''' by a 1,3-dipolar cycloaddition, wherein:

- R and R'are as defined above;

- R'' is -H or an amino acid side-chain;

- R''' is -H, an alkyl group of 1 to 5 carbon atoms, a $(CH_2CH_2O)_t$-CH$_3$ group, wherein t is an integer from 1 to 20, or an aromatic group;

to obtain a functionnalized carbon nanotube of formula I, if appropriate protected;

• if necessary, deprotecting the functionalized carbon nanotube of formula I, to obtain an unprotected functionalized carbon nanotube of formula I.

38. (withdrawn) A process for preparing a functionalized carbon nanotube of the following formula I:
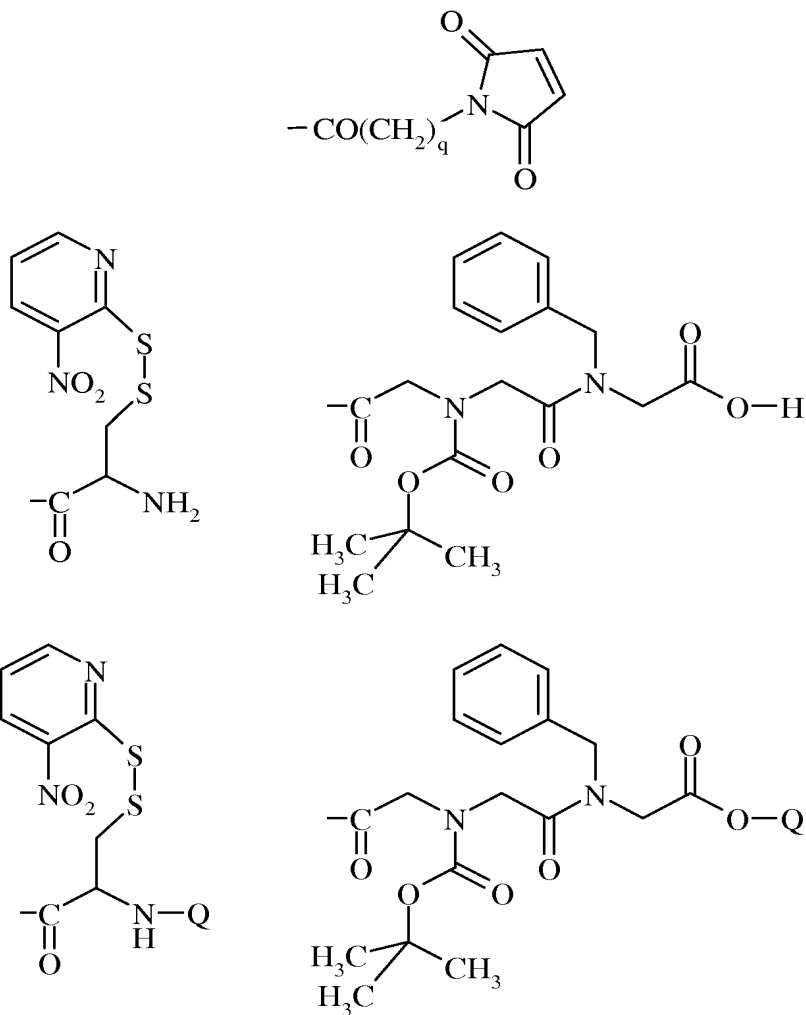

I

wherein T represents a carbon nanotube and independently from each other R and R' represent -H or a group of formula -M-Y-Z, provided R and R' cannot simultaneously represent -H, wherein:

▪ -M- is a spacer group from about 1 to about 100 atoms, such as a group selected from the list comprising -$(CH_2)_r$- or -$(CH_2-CH_2-O)_r$-CH$_2$-CH$_2$-, wherein r is an integer from 1 to 20;

▪ -Y- is a group derived from a reactive group, such as a group selected from the list comprising, -O-, -NH-, -COO-, -S-, -CH=, -CH$_2$-, -CC$_k$H$_{2k+1}$=, wherein k is an integer from 1 to 10, in particular -CCH$_3$=, or -CHC$_k$H$_{2k+1}$-, wherein k is an integer from 1 to 10, in particular -CHCH$_3$-;

▪ -Z is a linker group, liable to be linked to a P group, and if need be to release said P group, if appropriate

protected by a capping or a protecting group -Q, such as a group
of one of the following formulae:

$$-CO(CH_2)_q - \text{(maleimide)}$$

$$\text{(3-nitro-2-pyridyl disulfide cysteine)}$$

$$\text{(Boc-protected dibenzyl glycine-OH)}$$

$$\text{(3-nitro-2-pyridyl disulfide cysteine, N-Q)}$$

$$\text{(Boc-protected dibenzyl glycine-O-Q)}$$

wherein q is an integer from 1 to 10;

said process comprising the following steps:

• adding to a unprotected functionalized carbon
nanotube of formula I according to claim 37 a linker group of
formula Z, if appropriate protected by a capping or a protecting
group -Q, such as a group of one of the following formulae:

$$HOOC\text{-}(CH_2)_q - \text{(maleimide)}$$
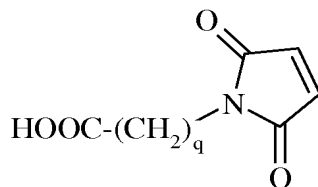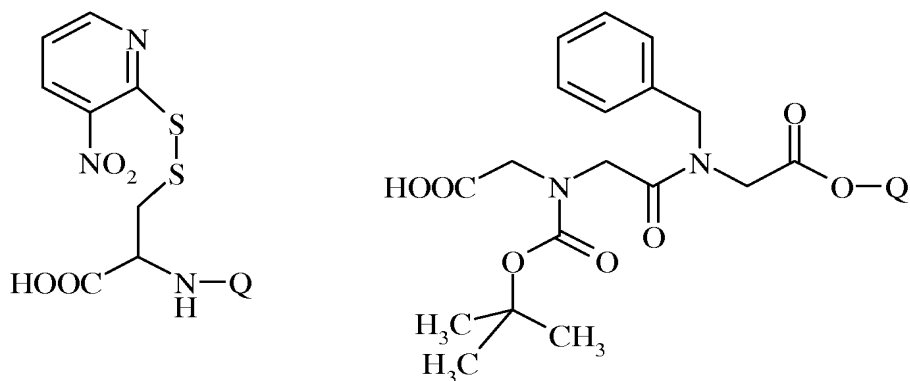
wherein q is an integer from 1 to 10;

to obtain a functionalized carbon nanotube of formula I, if appropriate protected;

- if necessary, deprotecting the functionalized carbon nanotube of formula I, to obtain an unprotected functionalized carbon nanotube of formula I.

39. (withdrawn) A process for preparing a fonctionalized nanotube of the following formula I:
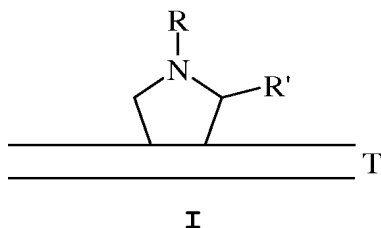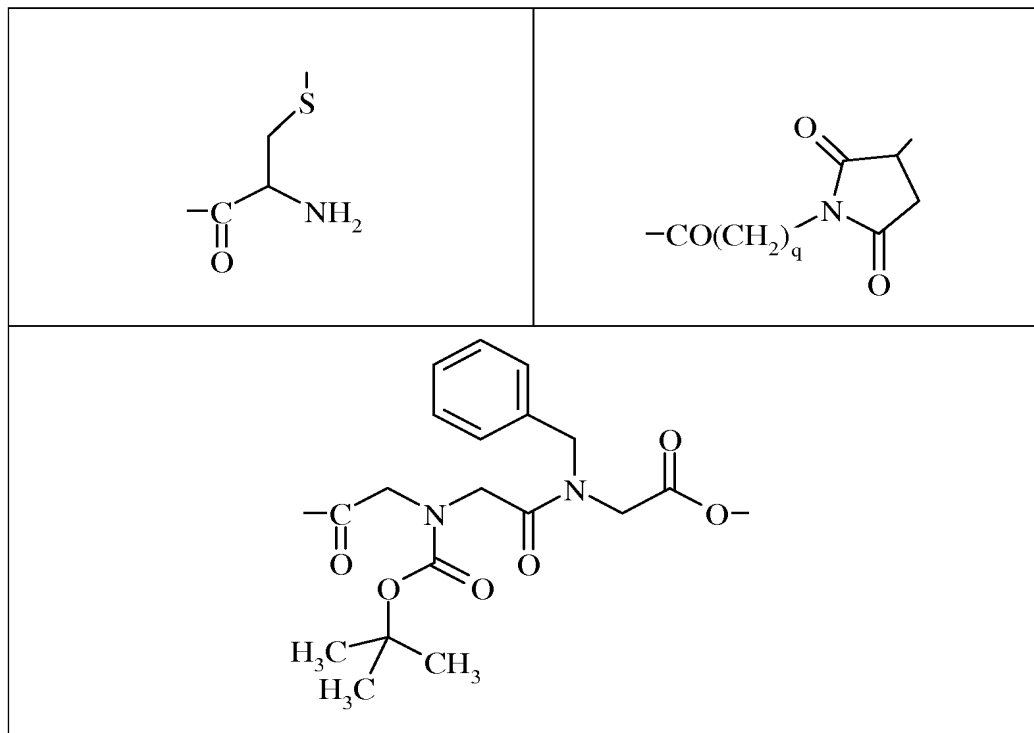

I

wherein T represents a carbon nanotube and independently from each other R and R' represent –H or a group of formula –M–Y–Z–P or of formula –M–Y–P, provided R and R' cannot simultaneously represent –H, wherein:

- –M– is a spacer group from about 1 to about 100 atoms, such as a group selected from the list comprising –$(CH_2)_r$– or –$(CH_2-CH_2-O)_r-CH_2-CH_2$–, wherein r is an integer from 1 to 20;

- –Y– is a group derived from a reactive group, such as a group selected from the list comprising, –O–, –NH–, –COO–, –S–, –CH=, –CH_2–, –CC_kH_{2k+1}=, wherein k is an integer from 1 to 10,

in particular $-CCH_3=$, or $-CHC_kH_{2k+1}-$, wherein k is an integer from 1 to 10, in particular $-CHCH_3-$;

▪ $-Z-$ is a linker group, liable to be linked to a P group, and if need be to release said P group, such as a group of one of the following formulae:

wherein q is an integer from 1 to 10;

▪ $-P$ is an effective group allowing spectroscopic detection of said functionalized carbon nanotube, such as a fluorophore, such as FITC, or an active molecule, liable to induce a biological effect, if appropriate protected, such as an amino acid, a peptide, a pseudopeptide, a protein, such as an enzyme or an antibody, a nucleic acid, a carbohydrate, or a drug;

said process comprising the following steps:

• adding to an unprotected functionalized carbon nanotube of formula I according to claim 37, an effective group or an active molecule of formula P, if appropriate protected, such as a fluorophore, such as FITC, an amino acid, a peptide, a

pseudopeptide, a protein, such as an enzyme or an antibody, a nucleic acid, a carbohydrate, or a drug,

or adding to an unprotected functionalized carbon nanotube of formula I, a group of formula Z-P, if appropriate protected,

to obtain a functionalized carbon nanotube of formula I, if appropriate protected;

• if necessary, deprotecting the functionalized carbon nanotube of formula I, to obtain an unprotected functionalized carbon nanotube of formula I.

40. (withdrawn) A process for preparing a peptide or protein functionalized carbon nanotube, of the following formula I:
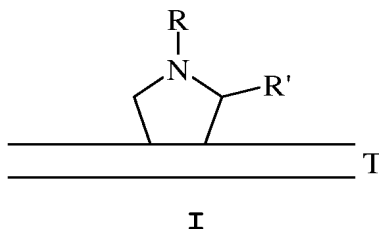
$$
\begin{array}{c}
R \\
| \\
N \!-\! R' \\
\end{array}
$$

T

I

wherein T represents a carbon nanotube and independently from each other R and R' represent H or a group of formula −M−Y−P, or of formula −M−Y−Z, provided R and R' cannot simultaneously represent −H, wherein:

▪ −M− is a spacer group from about 1 to about 100 atoms, such as a group selected from the list comprising −$(CH_2)_r$− or −$(CH_2-CH_2-O)_r-CH_2-CH_2$−, wherein r is an integer from 1 to 20;

▪ −Y− is a group derived from a reactive group, such as a group selected from the list comprising, −O−, −NH−, −COO−, −S−, −CH=, −CH_2−, −CC_kH_{2k+1}=, wherein n is an integer from 1 to 10, in particular −CCH_3=, or −CHC_kH_{2k+1}−, wherein k is an integer from 1 to 10, in particular −$CHCH_3$−;

▪ −Z− is a linker group, in particular a group of the following formula:

$$-CO(CH_2)_q-N \begin{array}{c} O \\ \\ O \end{array}$$
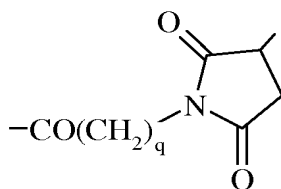
wherein q is an integer from 1 to 10;

- -P is a peptide, in particular of following formula: $-[OC-CHA_i-NH]_t-H$, wherein $-A_i$ is an amino acid side-chain, i is an integer from 1 to t and t is an integer from 1 to 150, advantageously from 1 to 50;

said process comprising the following steps:

- adding to a functionalized carbon nanotube of formula I, according to claim 37, a protected amino acid of the following formula:
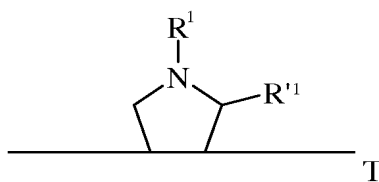
$$Q-NH-CHA_i-COOH$$

wherein $-A_i$ is as defined above and $-Q$ is a protecting group to obtain a functionalized carbon nanotube of the following formula II:

$$R^{1,pr}$$
$$| $$
$$N$$
$$\diagup \qquad \diagdown -R'^{1,pr}$$

$$T$$

II
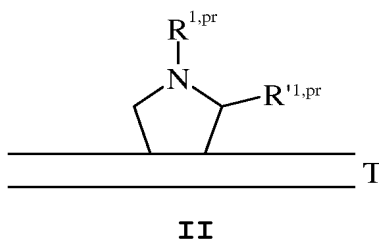
wherein independently from each other $R^{1,pr}$ and $R'^{1,pr}$ represent $-H$ or a group of formula $-M-Y-OC-CHA_i-NH-Q$, or of formula $-M-Y-Z-OC-CHA_i-NH-Q$, wherein $-M-$, $-Y-$, $-Z-$, $-A_i$ and $-Q$ are as defined above;

- deprotecting the functionalized carbon nanotube of formula II to obtain a functionalized carbon nanotube of the following formula III:
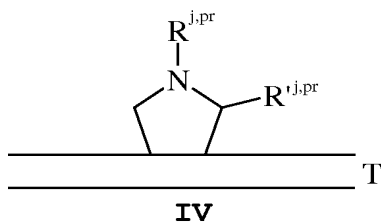
$$R^1$$
$$| $$
$$N$$
$$\diagup \qquad \diagdown -R'^1$$

$$T$$

17

III

wherein independently from each other R^1 and R'^1 represent –H or a group of formula $-M-Y-OC-CHA_i-NH_2$, or of formula $-M-Y-Z-OC-CHA_i-NH_2$, wherein –M–, –Y–, –Z–, and $-A_i$ are as defined above;

- adding to the functionalized carbon nanotube obtained at the preceding step a protected amino acid of the following formula:

$$Q-NH-CHA_i-COOH$$

wherein $-A_i$ is as defined above and –Q is a protecting group to obtain a functionalized carbon nanotube of the following formula IV:

IV

wherein independently from each other $R^{j,pr}$ and $R'^{j,pr}$ represent –H or a group of formula $-M-Y-[OC-CHA_i-NH]_j-Q$, or of formula $-M-Y-Z-[OC-CHA_i-NH]_j-Q$, wherein –M–, –Y–, –Z–, $-A_i$ and –Q are as defined above, and j is an integer from 2 to t;

- deprotecting the functionalized carbon nanotube of formula IV to obtain a functionalized carbon nanotube of the following formula V:


V
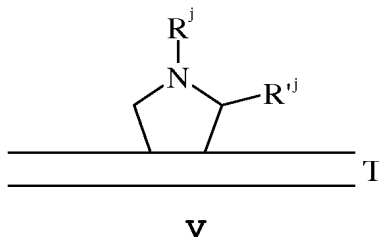
wherein independently from each other R^j and R'^j represent –H or a group of formula $-M-Y-[OC-CHA_i-NH]_j-H$, or of formula $M-Y-Z-[OC-CHA_i-NH]_j-H$, wherein –M–, –Y–, –Z–, and $-A_i$ are as defined above, and j is an integer from 2 to t;

• repeating the last two steps t-1 times to obtain a peptide or protein functionalized carbon nanotube of formula I.

41. (withdrawn) A process according to claim 38, wherein -Q is a capping group, such as CH_3CO- (acetyl), methyl, or ethyl, or a protecting group, such as a group selected from the list comprising methyl, ethyl, benzyl, *tert*-butyl, trityl, 3-nitro-2-pyridylsulfenyl, *tert*-butyloxycarbonyl (Boc), fluorenylmethyloxycarbonyl (Fmoc), benzylcarbonyl, trimethylsilylethyloxycarbonyl, phtalimide, or ethyleneoxy.

42. (withdrawn) A process for preparing a functionalized carbon nanotube of one of the following formulae VI and VII:
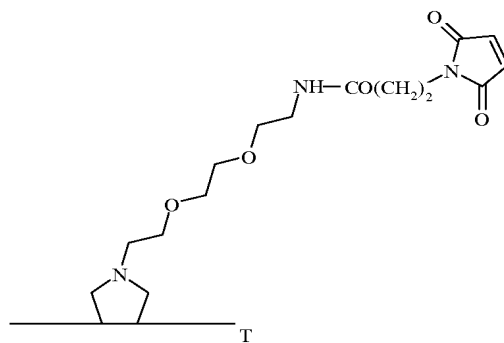

VI   **VII**
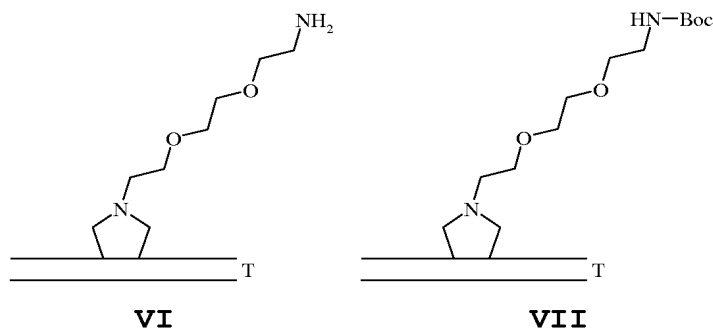
wherein T represents a carbon nanotube and Boc represents tert-butyloxycarbonyl, said process comprising the following steps:

• adding, to a carbon nanotube, the compounds $(CH_2O)_n$ (*para*formaldehyde) and $Boc-NH-(CH_2-CH_2-O)_2-CH_2-CH_2-NH-CH_2-COOH$ by a 1,3-dipolar cycloaddition, to obtain a protected functionalized carbon nanotube of formula VII;

• if necessary, deprotecting the protected functionalized carbon nanotube of formula VII, to obtain an unprotected functionalized carbon nanotube of formula VI.
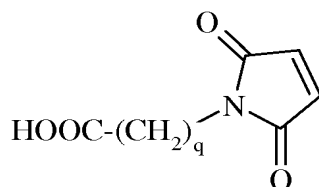
43.   (withdrawn)   A   process   for   preparing   a
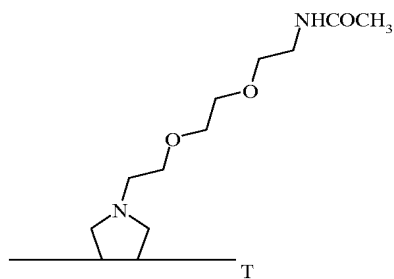functionalized carbon nanotube of the following formula VIII:

VIII

wherein T represents a carbon nanotube, said process
comprising the following step:

• adding, to a carbon nanotube of formula VI
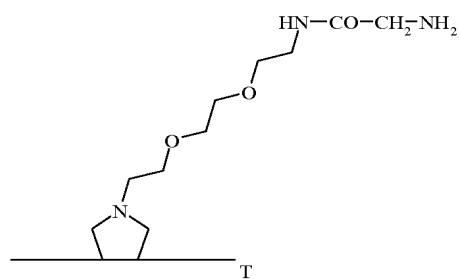according to claim 42, a compound of the following formula:

to obtain a functionalized carbon nanotube of
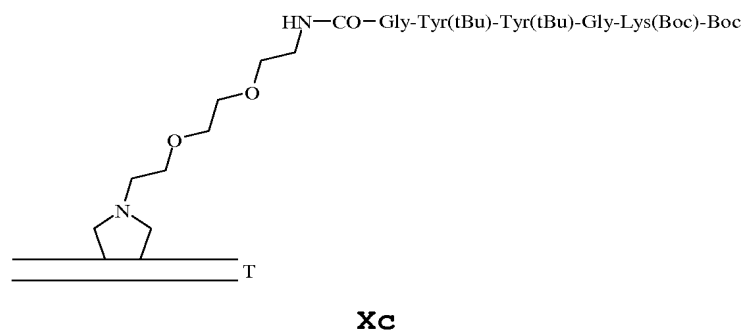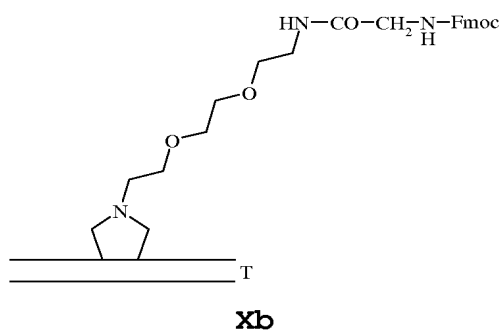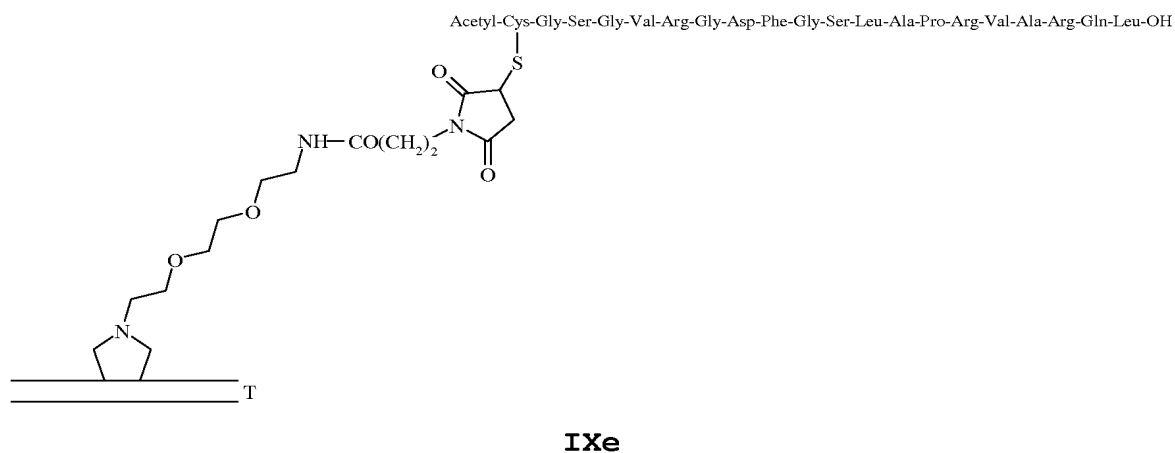formula VIII.

44.   (withdrawn)   A   process   for   preparing   a
functionalized carbon nanotube of one of the following formulae
IXa, IXb, IXc, IXd, IXe, Xb and Xc:

IXa

IXb

HN—CO—Gly-Tyr-Tyr-Gly-Lys-H

IXc

Acetyl-Cys-Gly-Ser-Gly-Val-Arg-Gly-Asp-Phe-Gly-Ser-Leu-Ala-Pro-Arg-Val-Ala-Arg-Gln-Leu-OH

NH—CO(CH₂)₂

IXe

HN—CO—CH₂—N—Fmoc

Xb

HN—CO—Gly-Tyr(tBu)-Tyr(tBu)-Gly-Lys(Boc)-Boc

Xc
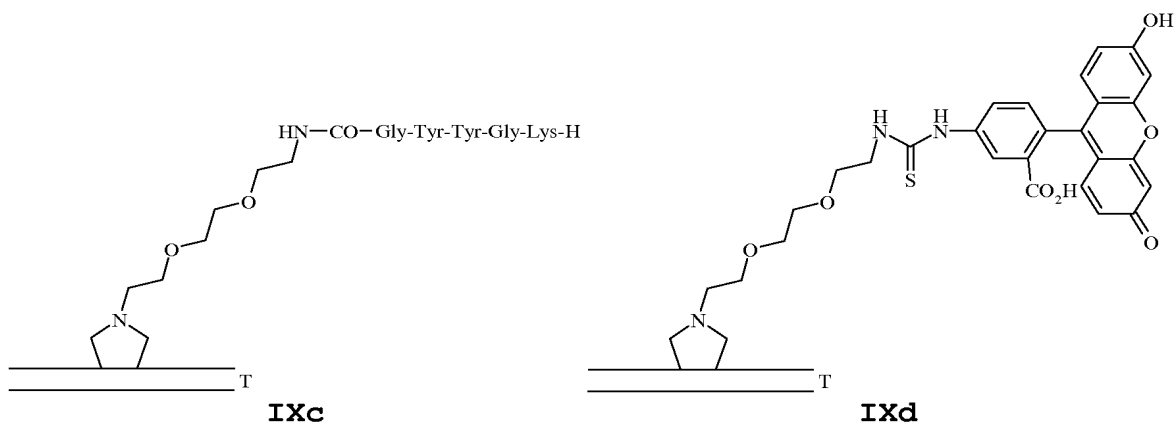
wherein T represents a carbon nanotube, Fmoc represents fluorenylmethyloxycarbonyl, tBu represents tert-butyl and Boc

represents tert-butyloxycarbonyl, said process comprising the following steps:

- • adding,

- - either to a functionalized carbon nanotube of formula VI according to claim 42, a group chosen among: CH_3-COOH, Fmoc-Gly-OH, Boc-Lys(Boc)-Gly-Tyr(tBu)-Tyr(tBu)-Gly-OH, or FITC,

- - or to a functionalized carbon nanotube of formula VIII, the following group, Acetyl-Cys-Gly-Ser-Gly-Val-Arg-Gly-Asp-Phe-Gly-Ser-Leu-Ala-Pro-Arg-Val-Ala-Arg-Gln-Leu-OH,

- to obtain a functionalized carbon nanotube of respective formula IXa, Xb, Xc, IXd or IXe;

- • if necessary, deprotecting the functionalized carbon nanotube of formula Xb or Xc to obtain respectively the functionalized carbon nanotube of formula IXb or IXc.

45. (currently amended) A functionalized carbon nanotube ~~such as obtained by the process of claim 37~~ of the following formula I:
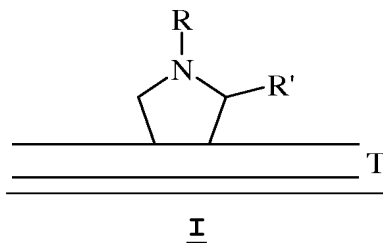
I

wherein:

T represents a carbon nanotube, and

R and R', independently from each other, represent -H or a group of
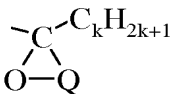
formula -M-Y,

provided R and R' cannot simultaneously represent H, wherein:

-M- is a spacer group from about 1 to about 100 atoms, and selected from the group consisting of $-(CH_2)_r-$ and $-(CH_2-CH_2-O)_r-CH_2-CH_2-$, wherein r is an integer from 1 to 20,

-Y is a reactive group selected from the group consisting of -OH, $-NH_2$, -COOH, -SH, -CHO, a ketone such as $-COCH_3$, an azide, and a halide, and optionally protected by a structure selected from the group consisting of -O-Q, -NH-Q, -COO-Q, -S-Q, $-CH(OQ)_2$,

$$\begin{array}{c} C_kH_{2k+1} \\ -C \\ O-Q \end{array}$$

wherein k is an integer from 1 to 10, wherein Q is a protecting group or forms a protecting group with the adjacent atoms to which it is linked,

said functionalized carbon nanotube obtained by the process comprising the following step:

adding, to a carbon nanotube, the compounds R'-CHO and R-NH-CHR'' -COOR''' by a 1,3-dipolar cycloaddition, wherein:

R and R' are as defined above,

R'' is -H or an amino acid side-chain,

R''' is -H, an alkyl group of 1 to 5 carbon atoms, a $(CH_2CH_2O)_t-CH_3$ group, wherein t is an integer from 1 to 20, or an aromatic group;

to obtain a functionalized carbon nanotube of formula I, optionally protected, and

optionally, deprotecting the functionalized carbon nanotube of formula I, to obtain an unprotected functionalized carbon nanotube of formula I.

46.   (withdrawn)   A pharmaceutical composition comprising as active substance at least one functionalized carbon nanotube according to claim 27, in association with a pharmaceutically acceptable vehicle, such as a liposome, a cyclodextrin, a microparticle, a nanoparticle, or a cell penetrating peptide.

47.   (withdrawn)   A method of transport of pharmaceutically active molecules comprising the use of a functionalized carbon nanotube according to claim 27.

48.   (withdrawn) A method of delivery of drugs, in particular of intracellular delivery of drugs, comprising the use of an appropriate amount of a functionalized carbon nanotube according to claim 27.

49.   (withdrawn)   A method of preparation of an immunogenic composition intended to provide an immunological protection to the individual to whom it has been administrated, comprising the use of an appropriate amount of a functionalized carbon nanotube according to claim 27.

50.   (withdrawn) A method for the treatment or the prophylaxis of cancer, autoimmune or infectious diseases, comprising the administration of an appropriate amount of a functionalized carbon nanotube according to claim 27.

51.   (withdrawn)   A method of preparation of functionalized surfaces such as plastic or glass surfaces comprising the use of a functionalized carbon nanotube according to claim 27.

52. (withdrawn) A method of preparation of electrochemical biosensors comprising the use of a functionalized carbon nanotube according to claim 27.

53. (new) The functionalized carbon nanotube according to claim 31, wherein X is a pyrrolidine ring, of the following general formula (I):
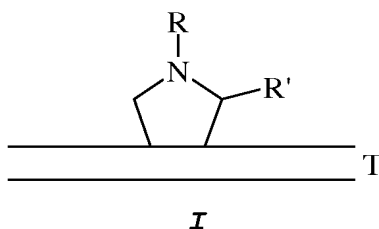
I

wherein:

T represents a carbon nanotube, and

R and R', independently from each other represent, —H or a group of

formula $-M-Y-(Z)_a-(P)_b$,

wherein:

a and b, independently from each other, represent 0 or 1, provided R and R' cannot simultaneously represent H,

M is a spacer group, selected from the group consisting of $-(CH_2)_r-$ and $-(CH_2-CH_2-O)_r-CH_2-CH_2-$, wherein r is an integer from 1 to 20,

Y is a reactive group when a=b=0, selected from the group consisting of $-OH$, $-NH_2$, $-COOH$, $-SH$, $-CHO$, a ketone, an azide and a halide, or derived from a reactive group, when a or b is different from 0, selected from the group consisting of $-O-$, $-NH-$, $-COO-$, $-S-$, $-CH=$, $-CH_2-$, and $-CC_kH_{2k+1}=$, wherein k is an integer from 1 to 10,

Z is a linker group, liable to be linked to at least one P group, and, optionally, to release said P group, selected

from the group consisting of the following formulae when a=1 and b=0:
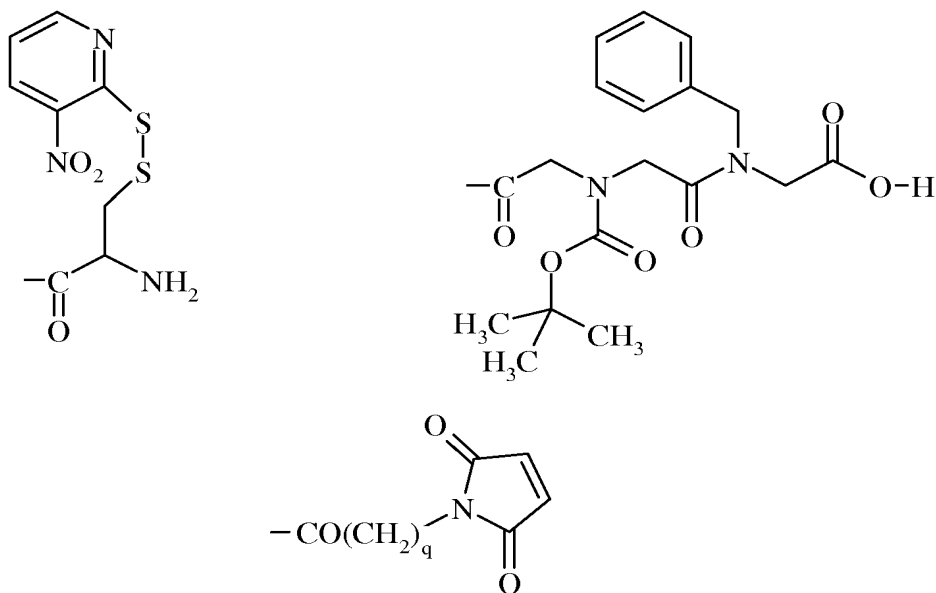
wherein q is an integer from 1 to 10,

or of one of the corresponding following formulae when a=1 and b=1:
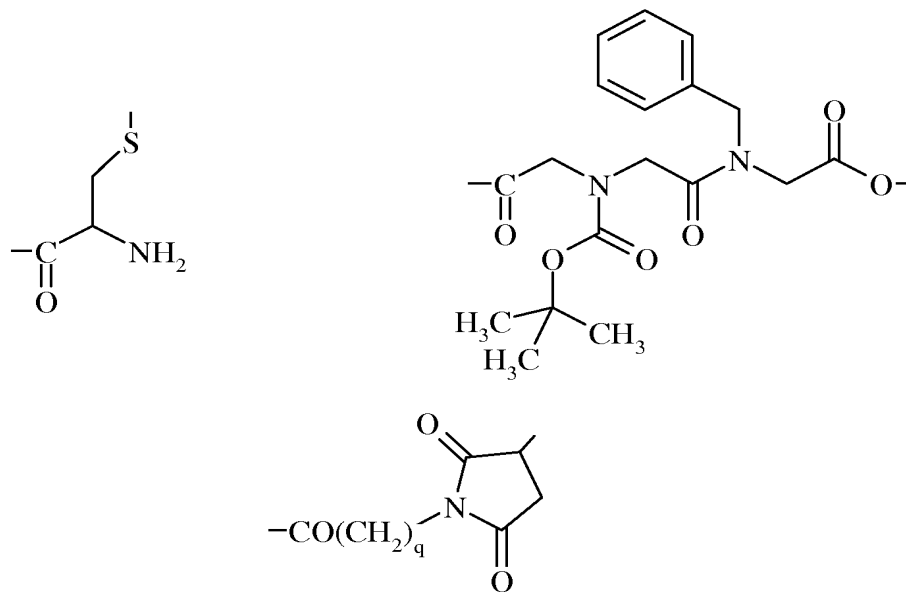
wherein q is an integer from 1 to 10, and

P is an effective group allowing spectroscopic detection of said functionalized carbon nanotube, selected from the group consisting of a fluorophore, FITC, and an active molecule, liable to induce a biological effect, selected from the group consisting of an amino acid, a peptide, a pseudopeptide, a protein, a nucleic acid, a carbohydrate, and a drug.

54. (new) The functionalized carbon nanotube according to 31, wherein

a=b=0, and being a functionalized carbon nanotube of one of the following formulae:

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